TRANSLATION

FUEL-HEATING UNITS FOR AIRCRAFT TEST STANDS

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FOREIGN TECHNOLOGY DIVISION

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FUEL-HEATING UNITS FOR AIRCRAFT TEST STANDS

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Units for heating fuel on aircraft test stands which include in themselves a preheater of the liquid heat carrier equipped with electrical heaters, a pump for providing the circulation of the heat carrier, a preheater of the fuel with coil-type heat exchangers, and piping are known.

The proposed unit, as compared with the known ones, has a simplified design in its construction, is more convenient in operation, and more reliably assures a constant temperature of the heated fuel in the process of tests of the fuel aggregate. For this purpose the preheater of the carrier is designed in the form of two coaxial vertically disposed cylinders filled with heat carrier and provided with electrical heaters, the lesser cylinder having installed in it a pump jointed by a vertical shaft with a two-speed electrical motor mounted on the flange of the cylinder. The pump provides the circulation of the heat carrier through the coiled piping of the fuel warmer or through a controllable connector in raising the temperature of the heat carrier.

In the drawing there are shown the principles of the design of the preheating unit.

The preheater of the heat carrier is designed in the form of two vertically set cylinders. The cylinder 1 is made broad in the upper part. On the flange of this cylinder there is fastened, with hermetical sealing, the removable ring 2. Inside of the cylinder 1 there is concentrically set the cylinder 3 fastened with hermetic sealing by the flange 4 on the ring 2. In the cylinder 3 there is placed the pump 5, driven with the aid of the vertical shaft passing inside of the bracket 6 from the two-speed electrical motor 7 fastened on the flange 4 of the cylinder 3. The preheater of the heat carrier is provided with electrical heaters 8 of the closed type (TEN) disposed vertically in the cylinders and connected into concentric groups. The output ends 9 of each electrical heater 8 by the individual flange 10 on the end 2 and the flange 4.

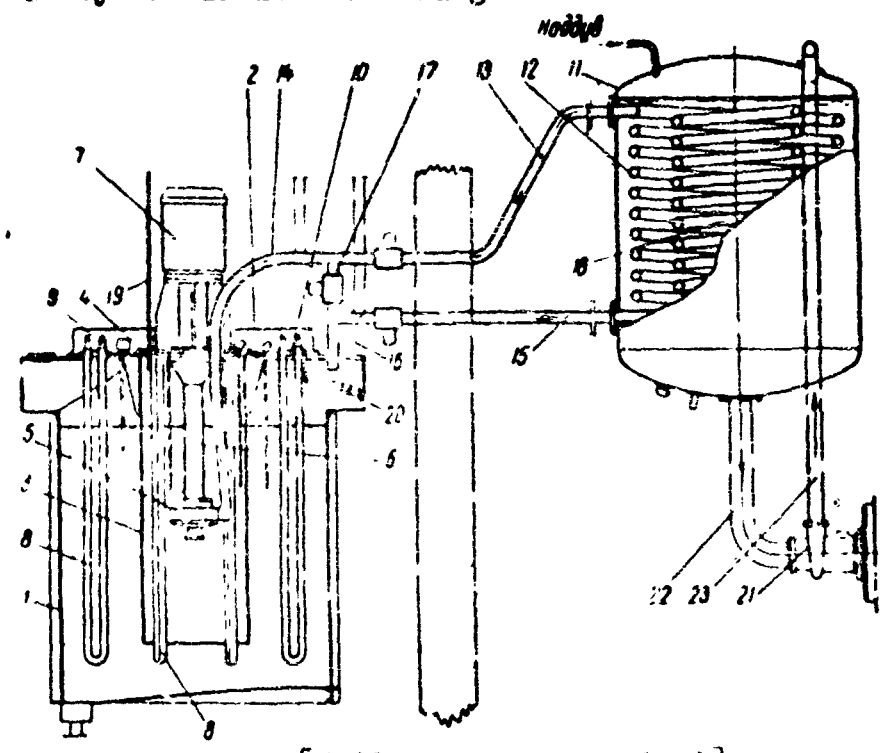

Figure [HaddyB = pressure feed]

The preheater of the heat carrier is located inside the shell of the test stand and is provided with dependable heat insulation. The fuel tank 11 is located in the shell of the test stand and is also dependably heat insulated.

Inside of the fuel tank there is mounted the coil-pipe heat exchanger 12, through which there circulates the heat carrier passing along the tube 13, connected with the output pipe 14 of the pump 5.

From the heat exchanger 12 the heat carrier is conducted back to the expanded cavity of the cylinder 1 along the piping 15 and the pipe 16 provided with a controllable cross connection 17 (valve), beyond which the tubing 16 is joined with the output tubing 14. For rapid cooling of the heated fuel the fuel tank is provided with a second coil-pipe heat exchanger 18 through which water is passed from the general water-supply system.

The minimum level of the heat carrier in the cylinders 1 and 3 should be such that the receiving pipe of the pump 5 will be constantly submerged in the heat carrier. The maximum level of the heat carrier in the cylinders is determined by the conditions for assuring the volume of the expanded part of the cylinder 1 sufficiently for full compensation of the amount of heat carrier, as a result of the heating and also the loss of steam into the atmosphere through the drainage tube 19.

In the tank 11 the fuel is under the pressure of natural gases. For combatting foam formation and better removal of bubbles of gas from the circulating heat carrier in the expanded cavity of the cylinder 1, there is provided an antifoam screen 20. To the fuel aggregate 21 tested on the stand the fuel from the tank 11 is passed along the piping 22 and taken back into the upper part of the tank 11 by the piping 23.

In accordance with the active technical requirements for testing aggregates of modern aviation fuel systems the unit should be provided with the proper equipment and instruments.

For putting the unit into the operational state with the presence of the maximum allowable level of heat carrier it is warmed up simultaneously by all

the heaters. When one gets in the cylinder 3 temperatures of the heat carrier of 60 to 70° C one cuts into the operation the electrical heater 7 at a low number of revolutions and the pump 5 pumps over the heat carrier with the open cross connection 17 through the piping 16 into the cylinder 1. As soon as the temperature of the heat carrier in the cylinder 1 gets up to 120 to 150°C the cross-over connector 17 closes, and the hot heat carrier circulates along the coil-pipe heat exchanger 12. On getting the required temperature of the heat carrier of 200°C and above, the electric motor passes over to the high rpm. When the stated temperature for heating the fuel is reached one begins the testing of the aggregates.

Object of the Invention

A unit for preheating fuel in aircraft test stands, which includes in itself a preheater of the liquid heat carrier with electrical heaters and a pump as well as a preheater of the fuel with coil-pipe heat exchangers, joined by tube connections which has the distinguishing feature that for the purpose of shortening the time and expenditure of electrical energy for heating the heat carrier and the fuel, and also for simplifying the design and operation of the unit, it in the preheater of the heat carrier is constructed in the form of two coaxial vertically disposed cylinders, provided with electrical heaters while at the same time in the cavity of the lesser cylinder there is mounted a pump joined by a vertical shaft with a two-speed electrical motor which assures the circulation of the heat carrier through the pipe coils of the preheater of the fuel or the controllable cross-over connection in the heating up of the heat carrier.